

AMENDMENTS TO THE CLAIMS

Applicant submits a new complete claim set showing marked up claims with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing.

1-52. (Cancelled)

53. (Previously presented) A surgical instrument for forming a suture in tissue, the instrument comprising:

a proximal end and a distal end, the distal end arranged to form at least one suture using a portion of suture wire;

a removable cartridge having a suture wire holder and an elongated suture wire guide, the cartridge having at least one opening arranged to expose a side of a portion of the suture wire; and

a drive mechanism at least partially receivable in the opening of the removable cartridge so that the drive mechanism contacts a portion of the exposed side of the suture wire, wherein actuation of the drive mechanism moves the suture wire toward the distal end of the instrument.

54. (Previously presented) The instrument of claim 53, further comprising:
means for rotating at least a portion of the distal end of the instrument.

55. (Previously presented) The instrument of claim 53, wherein the drive mechanism moves the suture wire with force sufficient to have a distal end of the suture wire penetrate tissue.

56. (Previously presented) The instrument of claim 53, further comprising:
a cutter that cuts a portion of the suture wire near the distal end of the instrument.

57. (Previously presented) The instrument of claim 56, wherein the cutter is adapted to cut the suture wire so as to form a sharp point on the suture wire.

58. (Previously presented) The instrument of claim 53, wherein the removable cartridge includes a wire guide support; and

wherein the at least one opening includes a pair of opposed lateral openings that expose at least opposed lateral sides of suture wire extending in the suture wire guide support.

59. (Previously presented) The instrument of claim 58, wherein the wire guide support includes an approximately "I" shaped cross-section.

60. (Previously presented) The instrument of claim 53, further comprising:
securing means for variably adjusting a securing force applied by the suture wire to tissue.

61. (Previously presented) The instrument of claim 60, wherein the securing means includes a rotation unit for rotating the distal end to twist together two portions of the suture wire so as to adjustably fix the suture wire to the tissue.

62. (Previously presented) The instrument of claim 61, wherein the rotation unit rotates the distal end about a longitudinal axis extending between the proximal and distal ends.

63. (Previously presented) The instrument of claim 53, wherein the distal end includes a pair of jaws movable relative to each other.

64. (Previously presented) The instrument of claim 63, wherein the jaws have opposed channels adapted to receive the suture wire.

65. (Previously presented) The instrument of claim 64, wherein the drive mechanism moves the suture wire through a channel in a first of the jaws, through tissue positioned between the jaws, and into a channel in a second of the jaws.

66. (Previously presented) The instrument of claim 53, further comprising:
a handle near the proximal end of the instrument and an elongated shaft between the proximal and distal ends such that the distal end of the instrument is sufficiently spaced from the handle to facilitate disposition and operation of the instrument in a closed surgical procedure.

67. (Previously presented) The instrument of claim 53, wherein the drive mechanism includes at least one drive wheel that contacts the suture wire.

68. (Currently amended) A suture wire supply cartridge for a suturing instrument having a drive mechanism, the suture wire supply cartridge comprising:

a length of suture wire;

a suture wire holder adapted to store at least a portion of the length of suture wire; and

an elongated suture wire guide defining a guide pathway for the suture wire;

wherein the suture wire supply cartridge has an opening adapted to expose a side of a portion of the suture wire and to receive at least a portion of the drive mechanism in contact with the exposed side of the suture wire, so that actuation of the drive mechanism draws suture wire from the holder and moves the suture wire along the guide pathway.

69. (Previously presented) The cartridge of claim 68, further comprising:

a suture wire guide support between the elongated suture wire guide and the suture wire holder, the suture wire guide support including the opening adapted to expose a side of a portion of the suture wire.

70. (Previously presented) The cartridge of claim 69, wherein the opening includes opposed lateral openings that expose at least opposed lateral sides of suture wire extending through the suture wire guide support.

71. (Previously presented) The cartridge of claim 68, wherein the suture wire guide comprises a tube through which the suture wire moves.

72. (Previously presented) The cartridge of claim 68, adapted for removable attachment to the suturing instrument.

73. (Currently amended) A suture wire supply cartridge for a suturing instrument, the suture wire supply cartridge comprising:

a length of suture wire;

a housing adapted to store at least a portion of the length of suture wire;

a guide tube defining a guide pathway for the suture wire; and

a guide tube support connected between the housing and the guide tube, the guide tube support having at least one opening that exposes at least a portion of a side of suture wire that extends from the housing through the guide tube support, the at least one opening adapted to receive at least a portion of a drive mechanism of the suturing instrument that engages the exposed portion of the suture wire to move the suture wire in the guide pathway of the guide tube.

74. (Previously presented) The cartridge of claim 73, wherein the guide tube support includes a portion having an approximately “I” shaped cross-section.

75. (Previously presented) The cartridge of claim 73, wherein the opening includes opposed lateral openings that expose at least opposed lateral sides of suture wire extending through the suture wire guide support.

76. (Previously presented) A suturing instrument for providing a suture in a subject during a medical procedure, the device comprising:

a proximal end, a distal end, and an elongated shaft with a longitudinal axis extending between the proximal and distal ends;

a first jaw and a second jaw mounted at the distal end, at least the second jaw having an opening;

a suture wire extending along the longitudinal axis toward the distal end;

a guide path that guides movement of the suture wire toward the distal end; and

a drive mechanism that moves the suture wire along the longitudinal axis toward the distal end of the device;

wherein the drive mechanism moves the suture wire with force sufficient to exit the first jaw, penetrate the tissue, and move through the opening in the second jaw.

77. (Previously presented) The instrument of claim 76, further comprising:

a cutter adapted to cut a portion of the suture wire near the distal end.

78. (Previously presented) The instrument of claim 77, wherein the cutter is adapted to cut the suture wire so as to form a sharp point on the suture wire.

79. (Previously presented) The instrument of claim 76, wherein the drive mechanism engages a side of the suture wire to move the suture wire.

80. (Previously presented) The instrument of claim 76, further comprising:
securing means for variably adjusting a securing force applied by the suture wire to the tissue.

81. (Previously presented) The instrument of claim 80, wherein the securing means includes a rotation unit for rotating the first and second jaws to twist together two portions of the suture wire so as to adjustably fix the suture wire to the tissue.

82. (Previously presented) The instrument of claim 76, wherein the first and second jaws are adapted to grip tissue between opposing jaw surfaces.

83. (Previously presented) The instrument of claim 76, wherein the drive mechanism includes at least one drive wheel that contacts the suture wire.

84. (Previously presented) The instrument of claim 76, wherein the first and second jaws have opposed channels adapted to receive the suture wire.

85. (Previously presented) The instrument of claim 84, wherein the drive mechanism moves the suture wire through a channel in the first jaw, through the tissue, and into a channel in the second jaw.

86. (Previously presented) The instrument of claim 76, further comprising:
a handle near the proximal end of the instrument, wherein the elongated shaft comprises an elongated tube extending between the handle and the distal end of the instrument, such that the distal end of the instrument is sufficiently spaced from the handle to facilitate disposition and operation of the instrument during a closed surgical procedure.

87. (Previously presented) The instrument of claim 76, further comprising:
a removable cartridge of suture wire.

88. (Previously presented) A suturing instrument, comprising:
a housing;
an elongated shaft extending distally from the housing and having a distal end;
pair of opposed jaws located at a distal end of the shaft, the jaws being arranged for rotation relative to the housing;
a source of suture wire located at least partially in the housing;
a drive mechanism for moving the suture wire along a distal pathway in the shaft and one of the jaws; and
a rotation unit adapted to rotate the jaws about the distal pathway.

89. (Previously presented) The instrument of claim 88, further comprising:
a cutter adapted to cut a portion of the suture wire near the distal end.

90. (Previously presented) The instrument of claim 89, wherein the cutter is adapted to cut the suture wire so as to form a sharp point on the suture wire.

91. (Previously presented) The instrument of claims 88, wherein the drive mechanism engages a side of the suture wire to move the suture wire.

92. (Previously presented) The instrument of claim 88, further comprising:
securing means for variably adjusting a securing force applied by the suture wire to the tissue.

93. (Previously presented) The instrument of claim 92, wherein the securing means includes a rotation unit for rotating the jaws to twist together two portions of the suture wire so as to adjustably fix the suture wire to the tissue.

94. (Previously presented) The instrument of claim 88, wherein the jaws are adapted to grip tissue between opposed surfaces of the jaws.

95. (Previously presented) The instrument of claim 88, wherein the drive mechanism includes at least one drive wheel that contacts the suture wire.

96. (Previously presented) The instrument of claim 88, wherein the jaws have opposed channels adapted to receive the suture wire.

97. (Previously presented) The instrument of claim 96, wherein the drive mechanism moves the suture wire through a channel in a first of the jaws, through the tissue, and into a channel in a second of the jaws.

98. (Previously presented) The instrument of claim 88, further comprising:
a handle on the housing of the instrument, and wherein the elongated shaft comprises an elongated tube extending between the handle and the distal end of the instrument, such that the distal end of the instrument is sufficiently spaced from the handle to facilitate disposition and operation of the instrument during a closed surgical procedure.

99. (Previously presented) The instrument of claim 88, further comprising:
a removable cartridge of suture wire.

100. (Currently amended) A method of applying sutures with a suturing instrument, the method comprising:

advancing a suture wire along the suturing instrument toward a distal end thereof;
forcing a free end of the suture material through tissue; and
twisting together the free end of the suture wire extending from the tissue and a remaining portion of the suture wire by rotating a portion of the suturing instrument so as to secure the free end of the suture material to the remaining portion of the suture wire.

101. (Previously presented) The method of claim 100, further comprising:

severing the twisted suture wire from suture wire remaining within the suturing instrument.

102. (Previously presented) The method of claim 100, further comprising:
selecting a strand of suture wire exhibiting such flexibility so as to (1) bend if not supported along a length thereof, and (2) twist upon itself and not deform the tissue into which it is driven.

103. (Previously presented) The method of claim 100, wherein a degree of twisting of the twisted-together portions of the suture material is selected so as to provide a selected tightness of a resulting strand loop extending through the tissue.

104. (Previously presented) The method of claim 100, further comprising:
providing a suturing instrument that is suitable for use in a closed surgical operation.